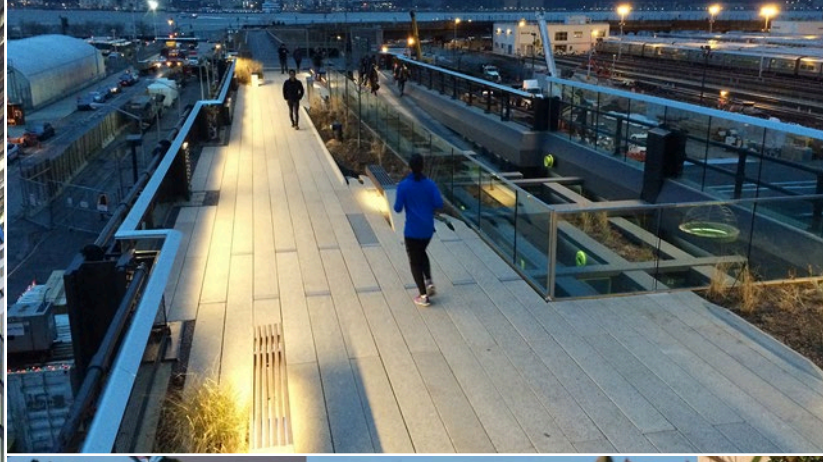

International Conference on Sustainable Infrastructure 2017

TECHNOLOGY

Proceedings of the International Conference on Sustainable Infrastructure 2017

› New York, New York
› October 26–28, 2017

EDITED BY

Lucio Soibelman, Ph.D.
Feniosky Peña-Mora, Sc.D.

ASCE

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SPONSORED BY
Committee on Sustainability of the American Society of Civil Engineers

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ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS

RESTON, VIRGINIA

Published by American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, Virginia, 20191-4382
www.asce.org/publications | ascelibrary.org

Errata: Errata, if any, can be found at https://doi.org/10.1061/9780784481219

ISBN 978-0-7844-8121-9 (PDF)
Manufactured in the United States of America.

Preface

THE CHALLENGE

The 2017 International Conference on Sustainable Infrastructure focused on developing roadmaps to address the UN Sustainability Goals of developing Sustainable cities and building resilient infrastructure as well as the NAE Grand Challenge to "restore and improve urban infrastructure," all while supporting the ASCE Grand Challenge of "how we can work together towards the shared goal of reducing life cycle costs by 50% by 2025 and foster the optimization of infrastructure for society."

THE ASCE

The American Society of Civil Engineers (ASCE) is respected worldwide for bringing to the forefront new ideas and critical concepts and technical knowledge on subjects of importance to the civil engineering professions and the public and private clients that civil engineers serve. Specialty conferences of the ASCE, such as ICSI2017, bring together, educate and inform the diverse civil engineering community, including practitioners, public and private infrastructure owners, policy makers, researchers, graduates and engineering students. The workshops, keynote lectures, panel discussions and tours broadened our understanding of research underway and best practices in the field.

THE CONFERENCE

The International Conference on Sustainable Infrastructure for an Uncertain World addressed what we know about an uncertain future, and probed the edges of what we do not know. Uncertainty prods engineers to go deeper, seek higher, and initiate research collaborations to assure that the best efforts can be brought together to combat the impact of climate change and energy unpredictability.

THE GOALS

These proceedings fulfill a primary purpose of the ICSI2017 conference: to assemble, deliver and disseminate a cogent and comprehensive assessment of he current state of sustainable infrastructure in an uncertain world. Local and global decision-making on energy policy, infrastructure maintenance, enhancement and replacement and investments in hydrology and transit were discussed and debated by experts from around the world. Those working to maintain and improve infrastructure performance in a rapidly changing operating environment face difficult and unprecedented challenges pertaining to lack of predictability, both fiscal and political. Civil engineers and allied professionals working for progressive public and private clients are able to take the long view in regards to the systems and public space that helps define the success of world class cities, from New

York to Paris, and Shenzhen to Montreal. To constructively provide infrastructure solutions to emerging needs, and responses that transcend electoral vicissitudes or geographic determinants, a broad, more long-ranging perspective becomes the cornerstone of the civil engineering profession's values and value.

THE SPEAKERS

This conference began with an emphasis on the role of cities and metropolitan areas, with keynote speakers that included some of the most distinguished luminaries from the civil engineering academic and professional communities. They were complemented by two strong and pragmatic voices for grand visions and reinventing the possible: New York City's First Deputy Mayor Anthony Shorris and Paris Deputy Mayor Jean-Louis Missika.

THE TECHNICAL SESSIONS

The technical sessions address issues of methodology, technology, finance, policy and education while describing case studies, projects, research and lessons learned about sustainability, resilience and social equity.

THE PUBLICATION

This publication includes all papers presented by the authors in the plenaries, the technical sessions and concurrent poster sessions. The technical papers range from five to twelve pages and describe in significant detail the results and findings from both research and practice-oriented projects of broad interest to the civil engineering community. Case studies are also included. Each of the papers accepted for podium or poster presentation received a detailed review and evaluation by members of the Steering and Advisory Committees. The papers published in this proceeding are organized on 3 main areas: (1) Technology, (2) Policy, Finance, and Education, and (3) Methodology.

Acknowledgments

The editors of this publication, on behalf of the American Society of Civil Engineers and the ICSI2017 Steering Committee, Advisory Committee and Technical Committee, wish to acknowledge and thank all those who presented from the conference podium or at the poster session. The editors also thank those who served on the conference committees, including those at the NYC Metropolitan Chapter of the ASCE. Reviewing papers, moderating and introducing panel discussions and organizing site visits and tours are often thankless tasks which individually and collectively made this conference possible and these Proceedings a reality.

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Contents

A Case Study and Recommendation for Large Scale Floating Wetlands

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Abstract

The urban waterfronts in the United States are largely characterized by hard shoreline walls of steel, concrete, timber, and stone. Though this construction maximizes area of usable property, it impairs natural ecosystems and further separates urban communities from the natural environment. On behalf of the National Aquarium (USA), and in collaboration with other design consultants, the authors are working to transform the highly urbanized canal between two piers in Baltimore, Maryland into a floating wetlands habitat. When complete, the installation will be the first floating wetlands system of this scale in the United States. The 15,000 square foot floating wetland will provide habitat for numerous native species including crabs, mussels, wading birds waterfowl, eels, and other fish species, while allowing visitors a unique perspective of the salt marsh habitat of the Chesapeake Bay. Though small-scale floating wetlands have been installed in the Baltimore harbor in the past, their maintenance and short service lives have been hindrances to their widespread use. This floating wetland design facilitates maintenance activities and extends the service life of the wetland indefinitely through use of inert plastic materials and an adjustable buoyancy system to counteract the accumulation of marine growth. This design solution blurs the boundaries between natural and structured urban environments, showing they can coexist and flourish together.

INTRODUCTION

The National Aquarium is in the process of reinventing the area surrounding its main waterfront campus, located at the Inner Harbor in downtown Baltimore, Maryland. The aquarium's waterfront campus, which helped lead the urban renewal of the Inner Harbor in the early 1980s, is now over 35 years old. The reinvention of the area around the aquarium will create a free, accessible, environmental public space, developed in partnership with Baltimore city organizations. The central tenet of the project is to encourage community engagement with the environment, build a vision of a sustainable future, and inspire conservation action, as well as potentially building a model for other urban waterfronts in the United States to follow. A centerpiece of the reinvention project is a large, 15,000 square feet, floating wetland and floating visitor platform as shown in Figure 1.